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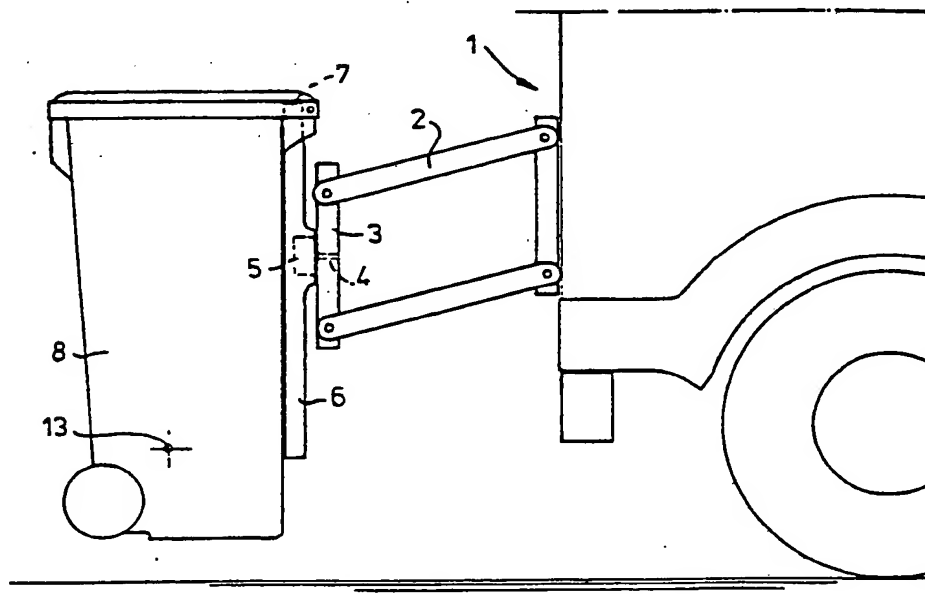


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**(54) Title:** DEVICE FOR THE MOBILE WEIGHING OF AN ARTICLE



**(57) Abstract**

Device for the mobile weighing of an article (8) fixed to a movable carrier (6). This carrier (6) is fixed to a frame (3), and at least one load cell (5) is present between the carrier (6) and the frame (3). The load cell (5) is connected to an external processing unit. Means are present in the load cell for digitising the signal to be fed to the processing unit (12). The load cell also comprises means for compensating for the moment applied to the carrier by the article.

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Device for the mobile weighing of an article

The present invention relates to a device for the mobile weighing of an article fixed to a movable carrier, which carrier is fixed to a frame, and in which at least one load cell, connected to an external processing unit, is present between the carrier and the frame.

Such a device is known from German Offenlegungsschrift 3,819,169. In this case a load cell is fitted between the frame and the carrier, for the purpose of weighing a refuse bin. In this case the frame is fitted on the back of a refuse lorry. The analog signal coming from the measuring or load cell is fed to a processing unit, for further processing.

Although such a device theoretically has great advantages compared with other conventional devices, due to its simple design, it appears that the device disclosed in the German Offenlegungsschrift does not work in practice. Firstly, the bin will always be moving relative to the frame, unless one waits an unacceptably long time in order to reach a completely stable state of the bin. Secondly, there will be the considerable risk that faults on the line acting as an antenna between the load cell and the processing unit will affect the measured result. The signal coming from the load cell is extremely weak. The third drawback is that a different reading is obtained depending on the position of the centre of gravity of the bin, because the influence of the moment exerted on the carrier cannot be compensated for by the load cell known from this German Offenlegungsschrift. This means that a different reading is obtained if a heavy article is lying at the back or front of the bin.

The object of the present invention is to avoid this disadvantage. This object is achieved in the case of a device of the type described above in that means are present in the load cell for digitising the signal to be fed to the processing unit, and that the load cell comprises means for compensating for the moment applied by the article to the carrier. This means that the centre of gravity of the article to be weighed is no longer important.

A load cell with means for digitising is known per se from US Patent Specification 4,657,097. The digitising ensures that the risk of faults occurring in the line between the load cell and the processing unit is completely removed. The simpler processing of the output signal is also disclosed therein. However, the device according to US Patent

Specification 4,657,097 is not suitable for compensating for variation of the centre of gravity of the article to be weighed, as a result of which variation a changing moment is exerted on the carrier. The means for compensating for this changing moment can comprise, for example,

- 5 compensating strain gauges already present in such weighing devices, or possibly other added strain gauges which measure in directions other than the usual ones.

In order to make the influence of the moment work in one direction, according to an advantageous embodiment of the invention, a  
10 hinge construction is fitted between the load cell and the frame.

The fact that the signal from the load cell is delivered in digital form means that it is possible to use various load cells in parallel, and to couple the signals coming from them by means of at least one bus coupling and feed them together to a processing unit. This makes  
15 it possible, for example in the case of a refuse lorry, to empty two bins at once, and to measure their weight simultaneously, while only one processing unit is necessary, and there is no risk of mutual interference between signals.

Although the invention is described above for use at the back  
20 of a refuse lorry, it must be understood that numerous other possibilities exist for use of the invention. For example, it is possible to fix the frame immovably and to construct the carrier from two parts which are movable relative to each other. In this case, one part of the carrier will be connected to the frame by means of the load cell, while  
25 the other part is movable relative to the first part of the carrier. All kinds of fixing devices, such as hooks, may be fitted on the movable part of the carrier.

The invention will be explained in greater detail below with reference to a number of examples of embodiments shown in the drawings,  
30 in which:

Fig. 1 shows diagrammatically the back of a refuse lorry with a refuse bin;

Fig. 2 shows the diagram of the load cell with the processing device used in Fig. 1; and

35 Fig. 3 shows a further embodiment of the device according to the invention.

In Fig. 1 the back of a refuse lorry is shown diagrammatically and is indicated by 1. Fixed to it is a parallelogram construction 2, on the end of which a frame 3 is fixed. Frame 3 can be moved up and down, in

a manner not shown in any further detail, by means of jack devices acting upon the parallelogram construction 2. Frame 3 is provided with a pivot point 4, in which one end of a load cell 5 is fastened so that it rotates freely. The other end of load cell 5 is rigidly connected to carrier 6.

- 5 At the top end 7, carrier 6 is provided with means for gripping a bin 8. As can be seen from Fig. 2, the signal coming from load cell 5 is transmitted by means of a line 9 and a coupling device 10 to a bus line 11, which is in turn connected to a processing unit 12.

- The cell used here is a so-called digital cell, i.e. the analog  
10 signal coming from the strain gauges in the cell is already converted to a digital signal in the cell. Means are also present in the cell for compensating for displacement of the centre of gravity of the bin. As shown in Fig. 1, the centre of gravity of bin 8 lies at point 13, due to the fact that a relatively heavy piece of material is present near the  
15 bottom end. It will be understood that if the centre of gravity 13 is moved further to the right in Fig. 1, this has an effect on the moment acting on the load cell. Compensation for the moment can be provided by, according to the invention, fitting in the load cell compensating devices, which can comprise compensating gauges already present in such  
20 load cells, or in particular compensating gauges fitted in other directions. Through the digitisation of the signal on line 9, it is possible to fit various coupling elements 10 in parallel, and to feed the signal by means of one bus line to processing unit 12. It is therefore possible in the case of, for example, a lorry to use different load cells  
25 for weighing separately or simultaneously two bins which are to be emptied essentially simultaneously, or for weighing a heavy bin.

- Fig. 3 shows a further embodiment of the invention. In this case the frame 15 is fixed immovably to the environment, and the carrier 16 is composed of two parts. One part 17 of the carrier 16 is fixed  
30 immovably to part 15 by means of load cell 18, while the other part, indicated by 18, can be moved on the part 17 of the carrier. Such a device can be used for, for example, all kinds of handling devices where moving articles have to be weighed. If, for example, its application is intended in slaughterhouses, a suspension hook 19 for carcasses can be  
35 fitted on part 18. In the case of the embodiment shown in Fig. 3, it is possible to fit a number of load cells next to each other, with the result that the weighing location becomes less critical, and a greater weight can be carried. It is also possible in the case of the embodiment shown here to feed the digital signals coming from the various load cells

to a processing unit in the manner shown in Fig. 2. In the case of this embodiment, the position of the centre of gravity of the article suspended from hook 19 can be varied. This can be brought about either by the article itself, or through the fact that bearing part 18 is movable  
5 in length.

Although a number of the potential applications of the present invention are given above, it must be understood that numerous modifications can be made thereto. For example, it is possible to use further hinge constructions, through which it is ensured that  
10 compensation is only for moment in one direction. This means that the load cell described above can be relatively simple in design.

Claims

1. Device for the mobile weighing of an article fixed to a movable carrier, which carrier is fixed to a frame, and in which at least one load cell, connected to an external processing unit, is present between  
5 the carrier and the frame, characterised in that means are present in the load cell for digitising the signal to be fed to the processing unit, and in that the load cell comprises means for compensating for the moment applied to the carrier by the article.
2. Device according to Claim 1, in which a hinge construction is  
10 fitted between the load cell and the frame.
3. Device according to one of the preceding claims, in which various load cells are present, and the signal coming from them is fed to the processing unit by means of at least one bus coupling.
4. Device according to one of the preceding claims, in which the  
15 carrier is designed to grip bins.
5. Device according to Claim 4, in which the frame is connected to a vehicle.
6. Device according to one of Claims 1 - 4, in which the frame is fixed and the carrier or the centre of gravity is movable relative  
20 thereto.

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fig -1

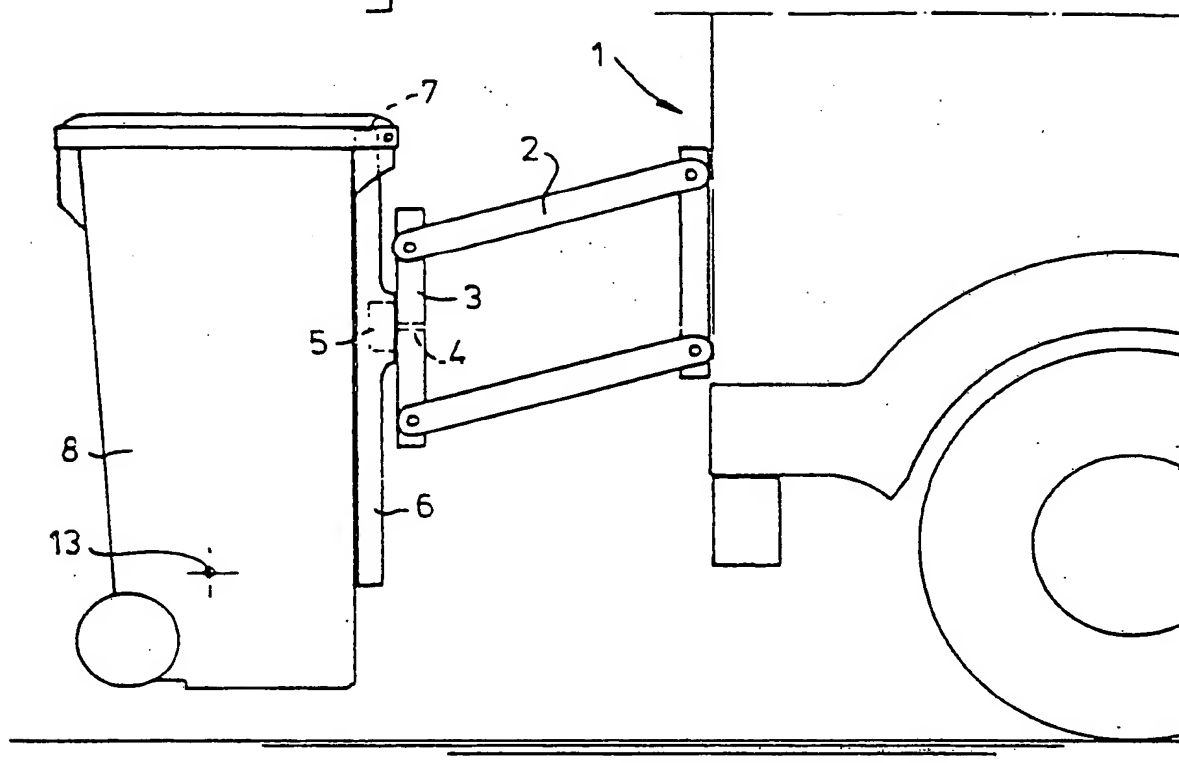


fig -2

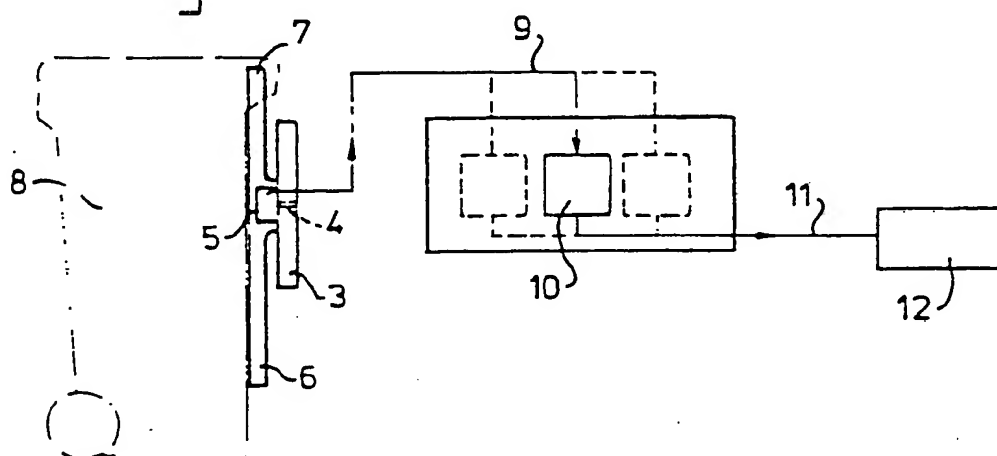
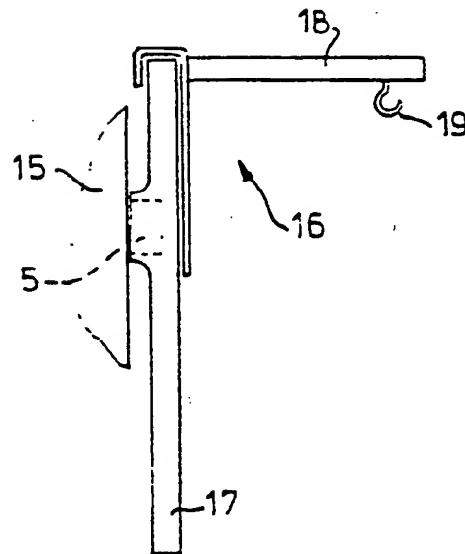




fig - 3



# INTERNATIONAL SEARCH REPORT

International Application No

PCT/NL 93/00042

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (If several classification symbols apply, indicate all) <sup>6</sup>		
According to International Patent Classification (IPC) or to both National Classification and IPC <b>Int.Cl. 5 G01G19/08</b>		
<b>II. FIELDS SEARCHED</b>		
Minimum Documentation Searched <sup>7</sup>		
Classification System	Classification Symbols	
Int.Cl. 5	G01G ;      B65F ;      G01L	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched <sup>8</sup>		
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT<sup>9</sup></b>		
Category <sup>10</sup>	Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>
Y	EP,A,0 402 352 (M-U-T MASCHINEN-UMWELTTECHNIK -TRANSPORTANLAGEN GMBH) 12 December 1990 see page 3, line 33 - line 44 see page 5, line 17 - line 20; figures 1,2 ---	1,2,4,5
Y	US,A,4 657 097 (NEIL C. GRIFFEN) 14 April 1987 cited in the application see column 2, line 10 - line 42 ---	1,2,4,5
A	EP,A,0 046 692 (WEIGH-TRONIX, INC.) 3 March 1982 see abstract; figure 3 ---	1
-/--		
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p><sup>10</sup> Special categories of cited documents :</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&amp;" document member of the same patent family</p> </div> </div>		
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Date of the Actual Completion of the International Search <div style="text-align: center; font-weight: bold;">14 JUNE 1993</div>	Date of Mailing of this International Search Report <div style="text-align: center; font-weight: bold;">1 8. 06. 93</div>	
International Searching Authority <div style="text-align: center; font-weight: bold;">EUROPEAN PATENT OFFICE</div>	Signature of Authorized Officer <div style="text-align: center; font-weight: bold;">GANCI P.A.</div>	

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category °	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
A	EP,A,0 186 820 (PONTECH G. FÜR TECHNOLOGISCHE ENTWICKLUNGEN MBH) 9 July 1986 see page 7, line 5 - page 8, line 10; figure ----	1
A	DE,A,3 910 791 (MERLE, BERND ET AL.) 11 October 1990 see column 8, line 62 - column 9, line 26; figures 2,3 ----	1
A	DE,A,3 819 169 (PFISTER GMBH) 7 December 1989 cited in the application see column 2, line 40 - column 3, line 39; figure ----	1
P,X	DE,U,9 203 099 (METTLER-TOLEDO B.V.) 14 May 1992 see the whole document ----	1-6
P,A	EP,A,0 521 847 (W. RIHA) 7 January 1993 see claim 1; figure 1 -----	1

**ANNEX TO THE INTERNATIONAL SEARCH REPORT  
ON INTERNATIONAL PATENT APPLICATION NO.**

NL 9300042  
SA 71608

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.  
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DE-A-3819169	07-12-89	None	
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EP-A-0521847	07-01-93	None	

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